

# LAWRENCE LIVERMORE REPORT

**A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, June 20- 24, 2011**

**The race is on**



When it comes to the most powerful computers in the world, it's clear that China and Japan have aggressive road maps to lead the way.

But as Bruce Goodwin, principal associate director of the Lab's Weapons and Complex Integration Principal Directorate, quotes the U.S. Council on Competitiveness "to out-compete is to out-compute." Goodwin and Thomas Zacharia, deputy director for science and technology at Oak Ridge National Laboratory, penned an editorial in the *Washington Post* that discusses how high performance computing has the potential to be a huge boon for the U.S. economy.

They use two examples of where supercomputers have had huge advantages in research and development. Boeing was able to use Oak Ridge's supercomputers to accelerate the design of the 787 and 747-8 airliners, allowing the company to get a better product out the door faster. LLNL partnered with Navistar Cop and used supercomputers to design technology that improved fuel efficiency in the trucking industry by reducing aerodynamic drag.

But the value of exascale computing also extends to America's manufacturing sector as well. Exascale simulation would drive digital design and prototyping of manufactured goods. The time and expense saved would give American industry a critical advantage in an increasingly competitive world market.

To read more, go to the [Web](#).

## Fighting bugs a different way



### The salmonella bacteria

The bacteria E. coli and salmonella could send anyone running to wash their hands, except the Lab's Paul Jackson.

Instead, he is developing a method to combat antibiotic-resistant bacteria by using the bacteria's own genes.

His team identified genes that encode proteins that are involved in different aspects of the cell's own metabolism.

"So the idea is rather than go after and knocking out some critical pathway with an antibiotic, we're going in there and basically co-opting the system and taking the genes that the organism normally has -- expressed proteins encoded by those genes -- and turn them around back against the pathogenic cells," he said.

To read more, go to the [Web](#).

## Award fuels the Laboratory



A smoke test conducted at the NASA Ames wind tunnel.

Using a virtual testing approach, Laboratory researchers have designed easily attachable devices to reduce a tractor trailer's aerodynamic drag, providing up to 17 percent fuel efficiency.

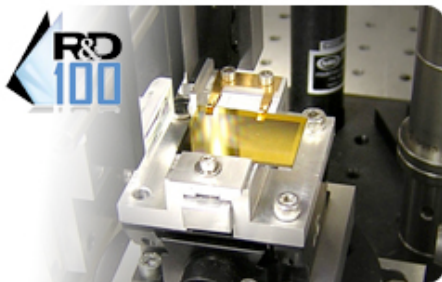
The work has earned an HPC Innovation Excellence Award for the Laboratory's Heavy Vehicle Aerodynamic Drag Project, led by Kambiz Salari, for its use of modeling and simulation to find practical ways to reduce aerodynamic drag and improve the fuel efficiency of the tractor trailers ubiquitous on America's highways.

The International Data Corporation (IDC) announced the award earlier this week at the International Supercomputing Conference (ISC11) in Hamburg, Germany.

This award recognizes the effort of the team that worked on this project, which was founded by LLNL's Rose McCallen in 1997. In 2005, Salari took over leadership of the LLNL program. The project has applied advanced-computing techniques to the reduction of aerodynamic drag in tractor trailers, and has demonstrated that high performance computing can be applied to everyday problems with a big potential payoff.

To read more, go to the [Web](#).

### **And the Oscar goes to...**



**An experimental testbed shows the Serrated Light Illumination for Deflection-Encoded Recording (SLIDER) mounted in a multi-axis coupling stage.**

The Laboratory has captured two awards known as the "Oscars of invention" for developing cutting-edge technologies with commercial potential.

A team of LLNL computer scientists and a team of engineers have won awards from the trade journal *R&D Magazine* for developing advances among the top 100 industrial inventions worldwide for 2010. One of the teams worked with two universities.

This year's R&D 100 awards will be presented Oct. 13 during a black-tie dinner at the SeaWorld Conference Center in Orlando, Fla.

With this year's awards, the Laboratory has captured a total of 137 such awards since 1978. U.S. Department of Energy labs received 36 R&D 100 awards this year.

To read more, go to the [Web](#).

**Ready or not, here we come**



Japan may have hit the top spot for the most powerful supercomputer this week, but Livermore is not far behind.

The Fujitsu "K" -- a play on the Japanese word for 10 billion and the number of operations per second it is designed to perform -- topped the semiannual ranking announced earlier this week at the International Supercomputing Conference in Hamburg.

The K is unlikely to keep its title for long, however. Livermore and IBM are working on a supercomputer, dubbed Sequoia and scheduled for completion next year, that will be a 20-petaflop (20 quadrillion operations per second) machine.

For more information, see the [Web](#).

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LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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